Amendments to the Drawings

The attached drawing sheets include changes to Figures 1, 3, 6-10, and replace the original drawing sheets for Figures 1, 3, 6-10. The change to the drawing is explained in detail below.

Attachments: Replacement Sheets for Figure 1, 3, 6-10; and
Annotated Sheets Showing Changes to Figure 1, 3, 6-10

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) Control device for a DC ~~motors provided with~~ motor, said motor comprising:

a commutator ~~for feeding their motor windings, said commutator~~ having at least four sliding contacts, ~~said device comprising~~ alternate ones of said sliding contacts forming a control group with a next following sliding contact and with a preceding sliding contact,

at least four windings connectable to said at least four sliding contacts such that each of said windings is arranged between subsequent sliding contacts,

a modulation stage generating ~~at least one~~ control signals modulated as to pulse width with a clock frequency substantially above ~~the~~ motor speed, and

a control circuit controlled by ~~the~~ at least one control signal and having at least ~~one~~ two load branches ~~feeding the commutator and~~ each being provided with an electronic switch controlled by one of the control signals modulated as to pulse width, each of said load branches being associated with one of said control groups for feeding the windings associated with the sliding contacts of said one control group ~~wherein the sliding contacts are combined to form at least two control groups, that the sliding contacts are combined within each control group to form shunt-fed pairs of sliding contacts and that each control group has its own load branch associated with it~~.

2. (Currently amended) Control device as defined in claim 1, wherein each load branch comprises a freewheeling component and an electronic switch connected in series to the ~~shunt-fed~~ pairs of sliding contacts.

3. (Original) Control device as defined in claim 1, wherein the modulation stage generates a separate control signal modulated as to pulse width for each of the load branches.

4. (Currently amended) Control device as defined in claim 1, wherein the ~~at least two~~ control signals have the same period duration.

5. (Currently amended) Control device as defined in claim 1, wherein the ~~at least two~~ control signals have an identical pulse width modulation for the load branches.

6. (Currently amended) Control device as defined in claim 1, wherein the ~~at least two~~ control signals are phase-locked in relation to one another.

7. (Currently amended) Control device as defined in claim 3, wherein the ~~at least two~~ control signals are shifted in phase relative to one another.

8. (Currently amended) Control device as defined in claim 1, wherein ~~the~~ a switch-on time period of one of the load branches and ~~the~~ a switch-off time period of the other one of the load branches are predetermined relative to one another and that ~~the~~ a time interval between the switch-on time period of the one of the load branches and ~~the~~ a switch-on time period of the other one of the load branches varies in accordance with the value of the PWM ratio to be set.

9. (Original) Control device as defined in claim 1, wherein a control of the at least two load branches is brought about such that one of the load branches is switched on when the other one of the load branches is switched off.

10. (Original) Control device as defined in claim 1, wherein in a first operating range each of the load branches is switched on only when the respectively other one of the load branches is switched off.

11. (Original) Control device as defined in claim 10, wherein in the first operating range each of the load branches is switched off with a gap in time prior to any switching on of the respectively other one of the load branches.

12. (Currently amended) Control device as defined in claim 11, wherein in the first operating range a minimum period of time of 0.5 % of ~~the~~ a period duration is provided between the switching off of each of the load branches and the switching on of the respectively other one of the load branches.

13. (Currently amended) Control device as defined in claim 10, wherein in the first operating range ~~the~~ a switch-on time period of the one load branch and ~~the~~ a switch-off time period of the other load branch vary.

14. (Currently amended) Control device as defined in claim 1, wherein in a second operating range one of the load branches is switched on only during ~~the~~ a switching off or after the switching off of the other one of the load branches.

15. (Currently amended) Control device ~~as defined in claim 1,~~ for DC motors comprising:

a commutator for feeding motor windings of said DC motor, said commutator having at least four sliding contacts, the sliding contacts being combined to form at least two control groups, the sliding contacts being combined within each control group to form pairs of sliding contacts fed in parallel,

a modulation stage generating at least one control signal modulated as to pulse width with a clock frequency substantially above a motor speed, and

a control circuit controlled by the at least one control signal and having at least two load branches, each load branch being provided with an electronic switch controlled by the control

signal modulated as to pulse width and feeding in parallel said pairs of sliding contacts of one of said control groups, said control circuit operating in a first and a second operating range,

wherein in the second operating range each of the load branches is switched on after ~~the~~ a switching on and prior to ~~the~~ a switching off of the respectively other one of the load branches.

16. (Currently amended) Control device as defined in claim 1, wherein the control circuit has a capacitor arranged on ~~the~~ a supply side of the load branches.

17. (Currently amended) Control device ~~as defined in claim 2, wherein~~ for DC motors comprising:

a commutator for feeding motor windings of said DC motor, said commutator having at least four sliding contacts, the sliding contacts being combined to form at least two control groups, the sliding contacts being combined within each control group to form pairs of sliding contacts fed in parallel,

a modulation stage generating at least one control signal modulated as to pulse width with a clock frequency substantially above a motor speed, and

a control circuit controlled by the at least one control signal and having at least two load branches, each load branch being provided with an electronic switch controlled by the control signal modulated as to pulse width and a freewheeling component, in each of the load branches the electronic switch is located between a first connection of the pairs of sliding contacts ~~forming~~ of a respective control group and a first voltage connection, and a second connection of the pairs of sliding contacts of the respective ~~contact~~ control group is in communication with a second voltage connection,

~~that~~ a freewheeling branch ~~is provided, said branch~~ having as series connection a capacitor connected to the first voltage connection and an inductor connected to the second connection of the pairs of sliding contacts, ~~as well as a~~ the freewheeling component ~~diode~~ located between a central tap between the capacitor and the inductor of the freewheeling branch and the first connection of the pairs of sliding contacts, said freewheeling branch enabling a freewheeling

current of the motor winding associated with the pairs of sliding contacts of the respective control group flowing via said freewheeling ~~diode~~ component when the electronic switch is opened.

18. (Original) Control device as defined in claim 17, wherein at least two load branches are connected in parallel to the one freewheeling branch.

19. (Original) Control device as defined in claim 18, wherein the at least two load branches are connected in parallel to the freewheeling branch in the same way.

20. (Currently amended) Control device as defined in claim ~~1~~ 17, wherein the at least two load branches have the same circuitry configuration.

21. (Original) Control device as defined in claim 17, wherein a first connection of the capacitor of the freewheeling branch is connected to a first connection of the electronic switch by means of a line having an inductance of less than 50 nano henry.

22. (Currently amended) Control device as defined in claim 17, wherein a second connection of the capacitor of the freewheeling branch is connected to the respective ~~diode~~ freewheeling component with a line having an inductance of less than 50 nano henry.

23. (Currently amended) Control device as defined in claim ~~1~~ 17, wherein ~~the~~ a product of ~~the~~ a value of the inductor and ~~the~~ a value of the capacitor in the freewheeling branch is greater than ~~the~~ a square of ~~the~~ a cycle time of the control signals modulated as to pulse width.

24. (Currently amended) Control device as defined in claim ~~1~~ 17, wherein the value of the capacitor of the freewheeling branch is greater than ~~the~~ a product of ~~the~~ a maximum value of the current through ~~the~~ an inductive load located between the respective pairs of sliding contacts

with ~~the~~ a ten-fold cycle time, divided by ~~the~~ a voltage between a supply voltage connection and a ground connection.